UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/038,771	01/08/2002	Matthew Boyd	7373/72556	6313

22242 7590 06/18/2004

FITCH EVEN TABIN AND FLANNERY
120 SOUTH LA SALLE STREET
SUITE 1600
CHICAGO, IL 60603-3406

EXAMINER	
FISCHER, JUSTIN R	

ART UNIT	PAPER NUMBER
1733	

DATE MAILED: 06/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/038,771	BOYD ET AL.	
	Examiner	Art Unit	
	Justin R Fischer	1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 April 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12-20 and 22-43* is/are pending in the application.

4a) Of the above claim(s) *30,42 and 43* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12-20 and 22-41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of a method of making a preform in office action dated February 5, 2004 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-5, 7-10, 12-15, 20, 22, 31-34, 38, 39, and 41 are rejected under 35 U.S.C. 102(b) as being anticipated by Hall (US 5,579,998). Hall is applied in the same manner as set forth in the previous office action (Paragraph 6).

As best depicted in Figures 1 and 2, Hall teaches a method of coating a support surface or substrate comprising the steps of providing reinforcing material, providing binder or liquid resin, mixing said reinforcing material and said binder so as to fully wet the reinforcing material, applying a stream of the mixture to said substrate, and curing or solidifying the coated substrate (Column 2, Lines 27-38 and Column 6, Line 59 - Column 7, Line 4, Column 7, Lines 25-33). In this instance, the coated substrate, after curing, is being viewed as the preform.

Regarding claims 2, 3, 32, and 33, the method of Hall fails to include forced air at the surface of the substrate or a plenum system. The gaseous stream that carries the reinforcing material is not seen to constitute "forced air at the support surface".

With respect to claim 4, as depicted in Figures 1 and 2, the mixture is sprayed against the support surface or substrate.

As to claims 5, 7, and 31, Hall suggests the use of fibrous material (analogous to chopped fibers) as the reinforcing material (Column 1, Lines 15-20).

Regarding claim 8, the resin or binder material is transferred through cylinder 12 and emitted as a stream through nozzle 1.

With respect to claims 9, 10, 13, 14, and 34, Hall suggests that the resin or binder can be heated (i.e. conditioned) while in the resin supply or during the transporting step to the substrate, both of which are prior to mixing with the reinforcing material.

Regarding claim 12, both the reinforcing material and the binder (plurality of streams) are supplied as a stream to a region adjacent the nozzle 1, at which time the components are mixed and disposed against the substrate.

As to claims 15 and 17, Hall suggests the following heating techniques: while said binder is in supply holding means, during circulation through lines, or in the cylinder itself (Column 6, Lines 39-45). Thus, the binder and reinforcing material are mixed while heat is applied if the binder is heated while it is in the cylinder (mixing of components occurs at end of cylinder).

With respect to claims 20, 22, 38, 39, and 41, as depicted in Figures 1 and 2, the binder/reinforcing material mixture is applied to a "vertical support surface" or substrate at ambient air conditions. The term "substrate" in Hall is seen to comprise a "solid support surface".

Regarding claim 31, the reinforcing material of Hall can be fibrous (Column 1, Lines 15-20). Also, Hall broadly suggests the use of a substrate, which is seen to include the formation of "structural parts", especially in view of a suggested use in aerospace hardware (Column 8, Lines 45-48).

4. Claims 1-4, 7, 8, 12, 20, 22, 23, and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Kelman (US 5,413,750). Kelman is applied in the same manner as set forth in the previous office action (Paragraph 7).

As best depicted in Figure 1, a combination of binder 25 and reinforcing material 19 is sprayed against a support surface or fabric layer 40. After depositing the above noted mixture against the fabric layer, the binder is allowed to cure or solidify before removal.

Regarding claims 2 and 3, the suction fan of Kelman is not seen to constitute "forced air at the support surface" or a "plenum system".

With respect to claim 4, as noted above, the reinforcing material and the binder are applied (sprayed) concurrently against the support surface.

Regarding claim 7, Kelman discloses the use of chopped fiberglass (Column1, 40-50).

As to claims 8 and 12, Figure 1 clearly depicts a stream of binder material 25 and a stream of reinforcing material 19 (represents a plurality of streams).

With respect to claims 20 and 22, the support surface of Kelman (preformed glass fabric layer) is seen to constitute a "vertical support surface" upon which said mixture is applied at ambient temperature.

Regarding claim 23, Kelman describes the support surface as a glass fabric material, such as a woven roving or a scrim (Column 1, Lines 40-50). These support surfaces are seen to constitute a solid, support surface having apertures or a perforated, support surface. It is further noted regarding claim 23 that the claim defines the inclusion of "apertures" in a surface defined as being "solid". It is unclear if applicant intended claim 23 to further define the solid support surface of claim 1.

With respect to claim 26, Kelman suggests the placement of a fiber preform into a mold, at which point a resinous plastic is injected to form the final composite article (Column 1, Lines 10-20).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hall and further in view of Sorathia (US 5,320,870, newly cited). As noted in the previous

paragraph, Hall discloses a method of coating a substrate and subsequently curing it to form a preform in which a stream of reinforcing material and a stream of resin/binder are combined and applied to a support surface. Hall suggests that the coated substrate can be used as thermal insulation or as an ablative coating in aerospace hardware (Column 8, Lines 45-48). In describing conventional coating techniques, Hall suggests that the reinforcing material is commonly fibers, glass microspheres, and the like (Column 1, Lines 15-20). A fair reading of the disclosure suggests that these reinforcing materials are applicable to the coating method and apparatus of Hall- while Hall might describe the use of glass microspheres and cork in more detail (as compared to fibers), the reference expressly suggests the use of fibers as the reinforcing material. However, the reference fails to teach the use of chopped fiberglass. In any event, one of ordinary skill in the art at the time of the invention would have found it obvious to use chopped fiberglass as the specific fibrous reinforcement in Hall since chopped fiberglass is extensively used within a variety of coatings and provides a high degree of reinforcement, as shown for example by Sorathia (Column 2, Lines 27-43). It is further noted that the chopped fiberglass/resin matrix of Sorathia is described as usable in fire protective coatings in which thermal insulation is desired- as noted above, the fibrous matrix/coating of Hall is described as a thermal insulation. Thus, the prior art of record recognizes the well-known use of chopped fiberglass and particularly, the known use of chopped fiberglass in the manufacturing of coatings useable as thermal insulation. Therefore, one of ordinary skill in the art at the time of the invention would have had

ample motivation to selected chopped fiberglass as the fibrous reinforcing material in the method of Hall.

7. Claims 1-4, 7-10, 12-20, and 22-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barron (US 6,030,575) and further in view of Kelman. Barron and Kelman are applied in the same manner as set forth in the previous office action (Paragraph 9).

Barron discloses a method of forming a preform comprising spraying reinforcing material and binder onto a screen (during spraying, components become mixed), wherein said binder material is heated just prior to contacting the reinforcing material. In this instance, though, the components are directly sprayed onto the screen- there is no support surface. One of ordinary skill in the art at the time of the invention would have found it obvious to include a support surface in the method of Barron since it is recognized in the art that direct fiber application onto a screen complicates the removal process and degrades the strength of the preform, as shown for example by Kelman (Column 1, Lines 20-35). It is emphasized that Barron and Kelman are directed to the manufacture of molded objects via a resin transfer molding operation (analogous environment).

Regarding claims 2 and 3, the method of Barron does not include forced air at the support surface or a plenum system, which is defined as a technique in which a greater pressure, as compared to the outside environment, is created within a closed chamber.

As to claim 4, the method of Barron in view of Kelman would include spraying the respective components against a support surface.

Regarding claims 5-7, Barron suggests the use of chopped fiberglass (Column 5, Lines 35-40 and Lines 60-62).

With respect to claims 8 and 12, the method Barron includes the concurrent spraying of reinforcing material and binder (Column 6, Lines 26-44).

As to claims 9, 10, 13-15, and 17-19, Barron (Column 6, Lines 26-44) suggests that the binder is conditioned or heated prior to contacting the reinforcing material. In this instance, Barron describes a preferred embodiment in which binder is sprayed through a heat source, such as a flame, prior to contacting the screen (or support surface in view of Kelman).

With respect to claim 16, Barron suggests the following: it is desirable to begin the binder melting process shortly before the fibers and the binder particles contact each other, since this assures some level of adhesion (Column 8, Lines 19-21). While the preferred method might be a pre-heating technique (before contact), the above noted language suggests that suitable adhesion between the binder and fibers can be obtained prior to the application of heat.

With respect to claims 20 and 22, as noted above, the use of a support surface would have been obvious in view of Kelman in order to eliminate the difficulties associated with direct fiber application onto screens. The support surface detailed by Kelman is seen to constitute a solid, vertical support surface as required by the claimed

invention. Also, the application described by Kelman and Barron is performed in ambient air conditions.

Regarding claim 23, Kelman describes the support surface as a glass fabric material, such as a woven roving or a scrim (Column 1, Lines 40-50). These support surfaces are seen to constitute a surface having apertures or a perforated surface. It is further noted regarding claim 23 that the claim defines the inclusion of "apertures" in a surface defined as being "solid". It is unclear if applicant intended claim 23 to further define the solid support surface of claim 1.

Regarding claims 24-29, Barron suggests "shaping" the preform prior to solidification, which occurs at the end of the resin transfer molding (RTM) process (Column 10, Lines 3-26). In this instance, Barron teaches (a) placing the preform in the mold, (b) injecting resin into said mold, and (c) curing or cooling the resin to form a solid composite part. With specific respect to claim 27, although Barron fails to expressly suggest the application of a vacuum before curing, this RTM technique is extremely well known and extensively used in the manufacture of a majority of molded articles. As noted above, Barron does suggest that the preform is shaped to match the contours of the mold- the use of a well-known vacuum means would assist in this shaping.

8. Claims 1-8, 12, 20, 22, 23, 25-29, 31-33, and 37-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US 5,045,251) and further in view of Kelman. Johnson and Kelman are applied in the same manner as set forth in the previous office action (Paragraph 10).

Johnson discloses a method of directly applying reinforcing material and binder to a screen to form a preform via a spray-up process, in which the respective components are concurrently sprayed (and thus mixed). In this instance, though, the components are directly sprayed onto the screen- there is no support surface (Column 3, Lines 36-62 and Column 5, Lines 5-38). One of ordinary skill in the art at the time of the invention would have found it obvious to include a support surface in the method of Johnson since it is recognized in the art that direct fiber application onto a screen complicates the removal process and degrades the strength of the preform, as shown for example by Kelman (Column 1, Lines 20-35). It is emphasized that Johnson and Kelman are directed to the manufacture of molded objects via a resin transfer molding operation (analogous environment).

Regarding claims 2, 3, 32, and 33, in describing the spray-up process, Johnson suggests that the use of vacuum is optional (Column 9, Lines 5-10). Thus, the reference positively describes a method in which the respective components are concurrently deposited against a support surface or fabric layer without the use of vacuum or any additional air means.

With respect to claims 4, 8, and 12, as noted above, Johnson describes the application as a "spray-up" process, in which a stream of binder material and a stream of reinforcement material are concurrently sprayed against a support surface (plurality of streams).

Regarding claims 5-7 and 37, Johnson describes the use of chopped fibers, including fiberglass (Column 8, Line 64 – Column 9, Line 10), wherein no vacuum is applied to the solid support surface as noted above.

As to claim 20, 22, 38, 29, and 41, the support surface described by Kelman is seen to constitute a vertical, solid support surface. In this instance, the components are applied at ambient temperatures.

Regarding claims 23 and 40, Kelman describes the support surface as a glass fabric material, such as a woven roving or a scrim (Column 1, Lines 40-50). These support surfaces are seen to constitute a solid support surface having apertures or a solid, perforated support surface. It is further noted regarding claim 23 that the claim defines the inclusion of "apertures" in a surface defined as being "solid". It is unclear if applicant intended claim 23 to further define the solid support surface of claim 1.

As to claim 25, the preform (combination of support surface and fiber/binder) is exposed to ambient air conditions, which is seen to constitute the cooling required by the claimed invention.

Regarding claims 26-29, Johnson describes the placement of the thus formed preform (reinforcing material/binder and support surface assembly) into a mold cavity to perform a resin transfer molding operation (Column 5, Lines 5-38). After injecting uncured resin into the mold cavity, the resin is allowed to cure to form the composite part or molded part. With specific respect to claim 27, vacuum is conventionally used in resin transfer molding processes to assist in the flow of resin through the preform and additionally to maintain fiber reinforced layer against support surface.

9. Claims 9, 10, 13-19, and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson and Kelman as applied in claim 1 above and further in view of Barron. Johnson, Kelman, and Barron are applied in the same manner as set forth in the previous office action (Paragraph 11).

In describing the formation of the preform, Johnson, in view of Kelman, suggests that binder and reinforcement material can be sprayed or blown onto a support surface. While these references fail to suggest conditioning (e.g. heating) the binder, one of ordinary skill in the art at the time of the invention would have found it obvious to condition or heat the binder in order to manufacture a preform having superior compaction and uniformity as compared to well known binder application methods, as shown by Barron (Abstract, Column 2, Lines 59-63, and Column, Lines 1-10). In this instance, Barron describes the benefits of using such a heating technique as compared to additional methods using solvent-borne binders, powdered binders, and thermoplastic binders. As such, it would have been obvious to one of ordinary skill in the art at the time of the invention to condition the binder in accordance to the limitations of the claimed invention.

As to claims 9, 10, 13-15, and 17-19, Barron (Column 6, Lines 26-44) suggests that the binder is conditioned or heated prior to contacting the reinforcing material. In this instance, Barron describes a preferred embodiment in which binder is sprayed through a heat source, such as a flame, prior to contacting the screen (or support surface in view of Kelman).

With respect to claim 16, Barron suggests the following: it is desirable to begin the binder melting process shortly before the fibers and the binder particles contact each other, since this assures some level of adhesion (Column 8, Lines 19-21). While the preferred method might be a pre-heating technique (before contact), the above noted language suggests that suitable adhesion between the binder and fibers can be obtained prior to the application of heat.

As to claims 34-36, Barron states that sufficient heat (for the binder) is necessary to adhere the fibrous reinforcement material (Column 6, Lines 45-60). The region in which the binder is heated and subsequently contacted with the fibrous reinforcement material is analogous to the heat zone of the claimed invention. With specific respect to claim 36, the method of Barron includes a plurality of streams. It is noted that if applicant intends this language to require multiple binder streams or multiple reinforcing streams, such a method would have been obvious at the time of the invention (would be needed if more than one binder or reinforcing material is desired).

Response to Arguments

10. Applicant's arguments filed on April 21, 2004 with respect to the rejection of claims 5, 6, and 31-41 with Kelman and Barron have been fully considered and are persuasive. The rejections of claims 5, 6, and 31-41 in view of Kelman and Barron have been withdrawn. However, applicant's arguments regarding the additional rejections with Kelman and Barron and the rejections with Hall and Johnson have been fully considered but they are not persuasive. Applicant individually argues the references as follows:

- Hall fails to suggest a mixing step in which the binder and the reinforcing material are provided in separate streams and the reference lacks a suggestion to use chopped fibers.
- Barron, Kelman, and Johnson include a foraminous screen to maintain the fibers in position, while the claim requires a solid support surface.

Regarding Hall, the reference expressly teaches that the reinforcing material is conveyed/emitted in a first stream through cavity 13 and the resin is conveyed/emitted in a second stream through cylinder 12 (Figure 2 and Column 8, Lines 60-67). In this instance, the respective components are only combined or mixed in a region adjacent the nozzle 1- the reference specifically states that the resin or binder is not combined with the reinforcing material within the spray apparatus. As to the type of reinforcement materials, the reference is generically directed to the coating of substrates and states "coating substrates with reinforced matrices, such as liquid resins reinforced with **fibers**, glass microspheres..." (Column 1, Lines 15-20). While the reference further describes embodiments in which glass microspheres and/or cork are used, the reference clearly envisioned the use of fibers or fibrous reinforcement, which is seen to constitute the chopped fibers of the claimed invention.

As to Barron, Kelman, and Johnson, it is agreed that each of the references includes a screen. However, Kelman expressly teaches the placement of a support surface on a screen prior to applying the resin/fiber mixture in order to (i) eliminate fibers extending through the screen, which contributes to manufacturing inefficiency

(difficult to remove preform) and (ii) eliminate any damage to the preform during removal and thus improve preform strength. Thus, Kelman provides ample motivation to include a support surface on the face of a screen when applying a resin/fiber mixture. Furthermore, the glass fabric of Kelman, such as a woven roving or a scrim, is seen to constitute a solid support surface. Applicant has not argued whether the support surface of Kelman is a solid support surface but rather that the inclusion of a screen and a suction fan necessarily means that a solid support surface is not present. As noted above, the glass fabric of Kelman, whether or not it is used in combination with a screen and a suction fan, is seen to constitute a solid support surface.

Regarding Johnson, the reference clearly suggests that the use of a vacuum is optional when applying a resin/fiber mixture to a surface/screen (Column 9, Lines 5-10). Thus, the reference is directed to embodiments in which no vacuum is applied to the surface being covered. Contrary to applicant's arguments, the removal of a vacuum does not destroy the method of Johnson by eliminating its essential, required elements- in fact, this embodiment is expressly suggested by Johnson. The only reason to describe the use of vacuum as optional is because the prior art (Johnson) contemplated a method in which no vacuum was applied; therefore, the exclusion of a vacuum is not seen to destroy the method of Johnson.

Lastly, it is not seen how the rejections using Johnson in view of Kelman and Johnson in view of Kelman and Barron require the destruction of Kelman and/or Barron. As noted above, each of the above noted references is directed to a similar method in which a resin/fiber assembly is applied to a surface, wherein Kelman suggests that the

application surface be a support surface instead of the surface of the screen. In this instance, Johnson suggests the use of a screen with or without vacuum- one of ordinary skill in the art at the time of the invention would have readily appreciated the use of a solid support surface in either embodiment in order to eliminate the flow or extension of fibers through the openings of the screen, as suggested by Kelman. Thus, neither Kelman nor Barron are destroyed when modifying the method of Johnson.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Justin R Fischer** whose telephone number is **(571) 272-1215**. The examiner can normally be reached on M-F (7:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Justin Fischer

May 27, 2004

JEFF H. AFTERGUT
PRIMARY EXAMINER
GROUP 1300